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Forest
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Department of
Agriculture

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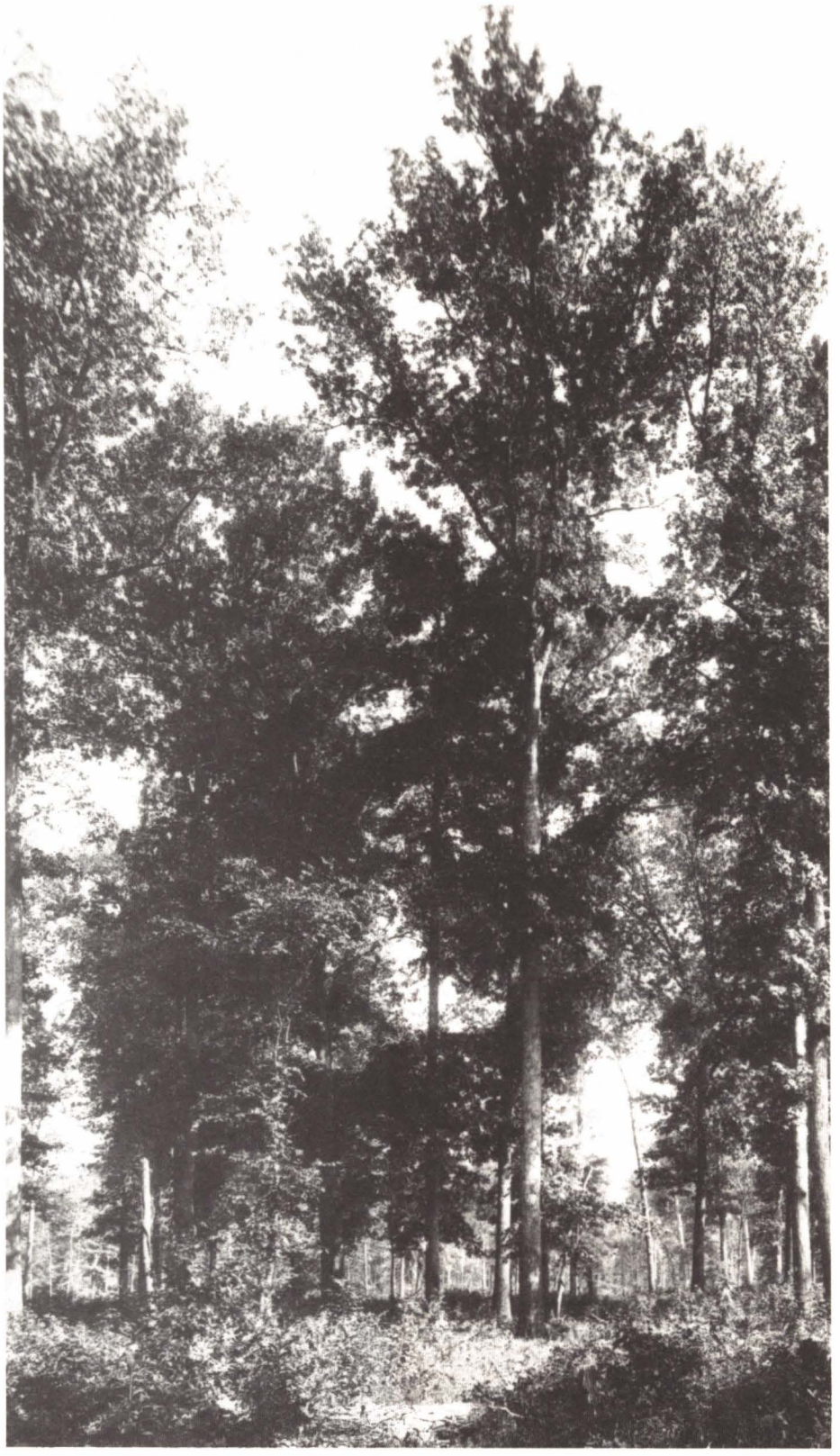
Sweetgum

An American Wood

Sweetgum grows throughout much of the Eastern United States and is found scattered throughout Mexico and Central America. The wood is attractive, moderately heavy, even-textured, and machines reasonably well. It is used for a variety of purposes, with furniture, plywood, containers, and pulp requiring the most volume. Production is near an all-time high, and the supply has been slowly increasing because sweetgum grows and reproduces well.



Sweetgum
(*Liquidambar styraciflua* L.)

Robert L. Johnson[1]

Distribution

Sweetgum (*Liquidambar styraciflua* L.) occurs naturally in the Southeastern United States. Its range extends northward to central Indiana and along the coastal plain to southwestern Connecticut, westward to eastern Texas, and southward to central Florida. It also grows in several states of Mexico and in Guatemala, Belize, Honduras, El Salvador, and Nicaragua (fig. 1).

Within its range, sweetgum can be found from sea level to an elevation of about 2,000 feet in the United States and nearly 7,000 feet in Central America. It tolerates a wide variety of soils. Average annual minimum temperature varies from minus 10 ° F to above 60 ° F. Growing season ranges from about 150 days in the Northern United States to 365 days in parts of Central America. Rainfall varies from less than 40 inches per year to more than 80 inches. However, where rainfall is less than 40 inches, occurrence is generally restricted to areas close to a water course, swamp, lake, or spring.

Best growth and most commercial production is on moist, well-drained soils. Alluvial lands of the Ohio and Mississippi Rivers, valleys of minor rivers and stream bottoms of the Gulf and Atlantic coastal plains, and coves of the Ozark and Cumberland uplands provide excellent sites.

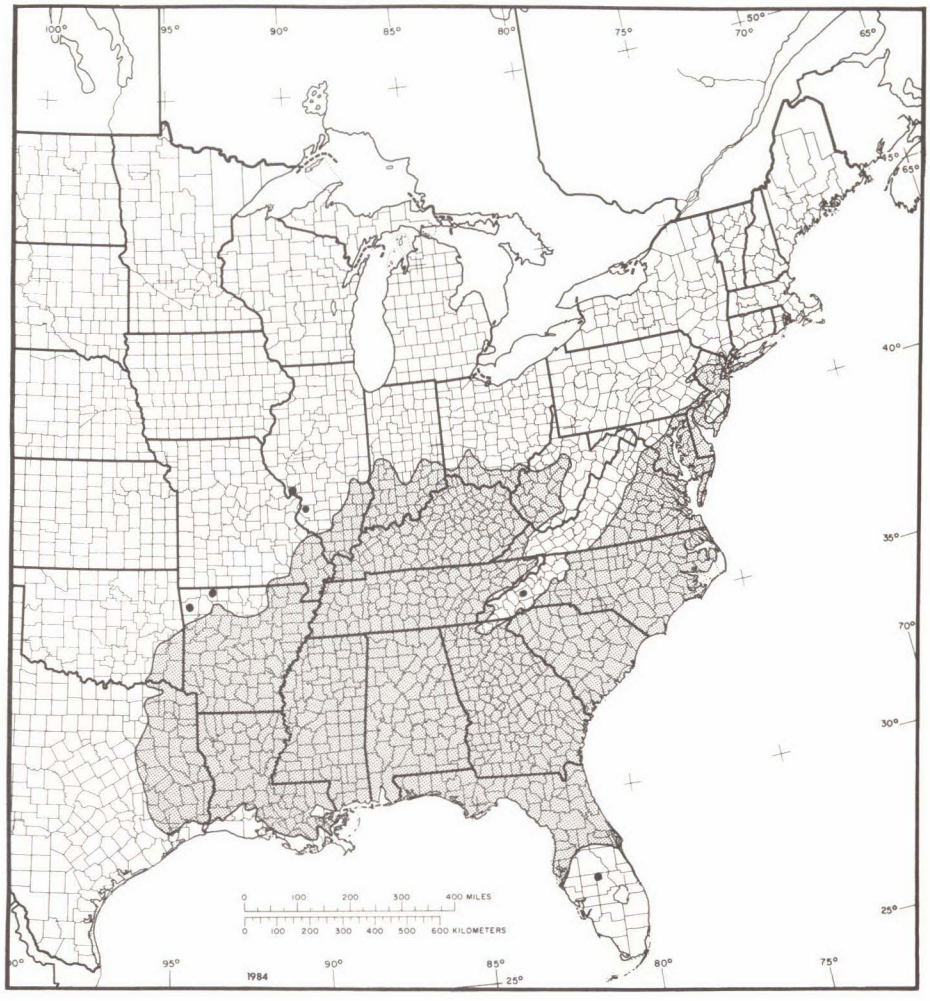


Figure 1—Natural range of sweetgum.

Description and Growth

Mature trees are 1.5 to 3 feet in diameter at breast height, depending on site. The largest known sweetgum in the United States is 6.3 feet in diameter and 125 feet tall; its crown spreads 100 feet.

Sweetgum bark is gray to black and deeply furrowed, especially on older trees (fig. 2). Twigs often bear corky ridges, adding to the tree's attractiveness in landscape planting (fig. 3). Leaves are alternate, simple, and deciduous; their star shape distinguishes them from all other trees native to the United States (fig. 4). Fall coloration may be yellow, red, or purple, making the tree very attractive. Inconspicuous greenish flowers are found in the spring on open-grown trees as young as 4 years; forest trees usually do not produce flowers until 20 to 25 years. Fruit is a spiny ball that persists through most of the winter. Cavities at the base of each spine open in the autumn to release one or two small, winged seeds. Some seed is produced nearly every year; abundant crops occur every 3 or 4 years.

The species habitually grows mixed with other hardwoods, mainly oaks and pines. It is a key species in the pin oak–sweetgum, sweetgum–willow oak,

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Figure 2—Sweetgum bark.

sycamore–sweetgum–American elm, and sweetgum–yellow-poplar forest cover types and an important component in 24 other types.[2] On old fields particularly, sweetgum is often predominant or may even form pure stands, small areas of which can contain as much as 40,000 board feet per acre at maturity. Following harvest in mixed stands, the sweetgum component commonly increases as a result of numerous sprouts emanating from stumps and roots. Sprouts appear to be as desirable as seedlings for regeneration of a stand.

Seedlings survive under partial shade but require substantial light for maximum growth. On good sites, better trees grow, on the average, 2 to 3 feet in height and 0.3 to 0.4 inch in diameter annually through age 25. Trees may maintain about the same rate of annual diameter growth during the next 25 years, but their annual height growth will drop to 1 to 2 feet. Where moisture is limited, as on dry upland sites, sweetgum may persist for many years, but it grows very slowly and seldom reaches sawtimber size.

Pure sweetgum stands on high quality sites should be thinned before the largest trees exceed 6 inches in diameter at breast height; otherwise, vigor and growth of most trees are reduced. Too much thinning at any stage in the development of a sweetgum stand can release dormant buds located on the trunk, resulting in the formation of epicormic branches that degrade and devalue the wood for several commercial products. Top breakage and permanent changes (up or down) in the water table can also trigger epicormic branching.

The beaver *(Castor canadensis)* prefers sweetgum to most other tree species in southern bottom lands. If beavers

[2]As classified by the Society of American Foresters.

damage more than one-fourth of its circumference, a tree may begin to rot and can die. A principal insect enemy of sweetgum is the forest tent caterpillar *(Malacosoma disstria),* which strips leaves and flowers just as trees start growing in the spring. Few trees are killed by this insect, but growth is reduced. Prolonged drought will cause sweetgum tops to die back and can result in widespread mortality.

Common Names

Sweetgum is the preferred common name, but the species is also called gum, redgum, starleaf-gum and bilsted. The genus name, *Liquidambar,* refers to the amber-colored liquid sap, and the species name, *styraciflua,* means styrax-flowing. Medicinally, the tree is known as "copalm balsam."

Related Commercial Species

Sweetgum is inventoried in the forest as a single species. In the lumber trade, however, sweetgum heartwood is commonly called redgum, whereas sapwood is referred to as sapgum or simply gum, in common with the tupelos *(Nyssa aquatica, N. sylvatica* var. *sylvatica,* and *N. sylvatica* var. *biflora).* In Europe, heartwood and sapwood are sometimes sold as satin walnut and hazel-pine, respectively.

Supply

Estimated sawtimber volume in 1920 was 44.2 billion board feet. By 1945, it was only 26 billion board feet, the same amount recorded in 1953, 1962, and 1970. In 1976, the supply had increased to 32.5 billion board feet, and annual growth was estimated at 1.5 billion board feet.

Total volume in sweetgum of merchantable size (more than 5 inches in diameter at breast height) was 10 billion cubic feet in 1963 and again in 1970. In 1976, the volume was 13.6 billion cubic feet, and net growth was 600 million cubic feet per year.

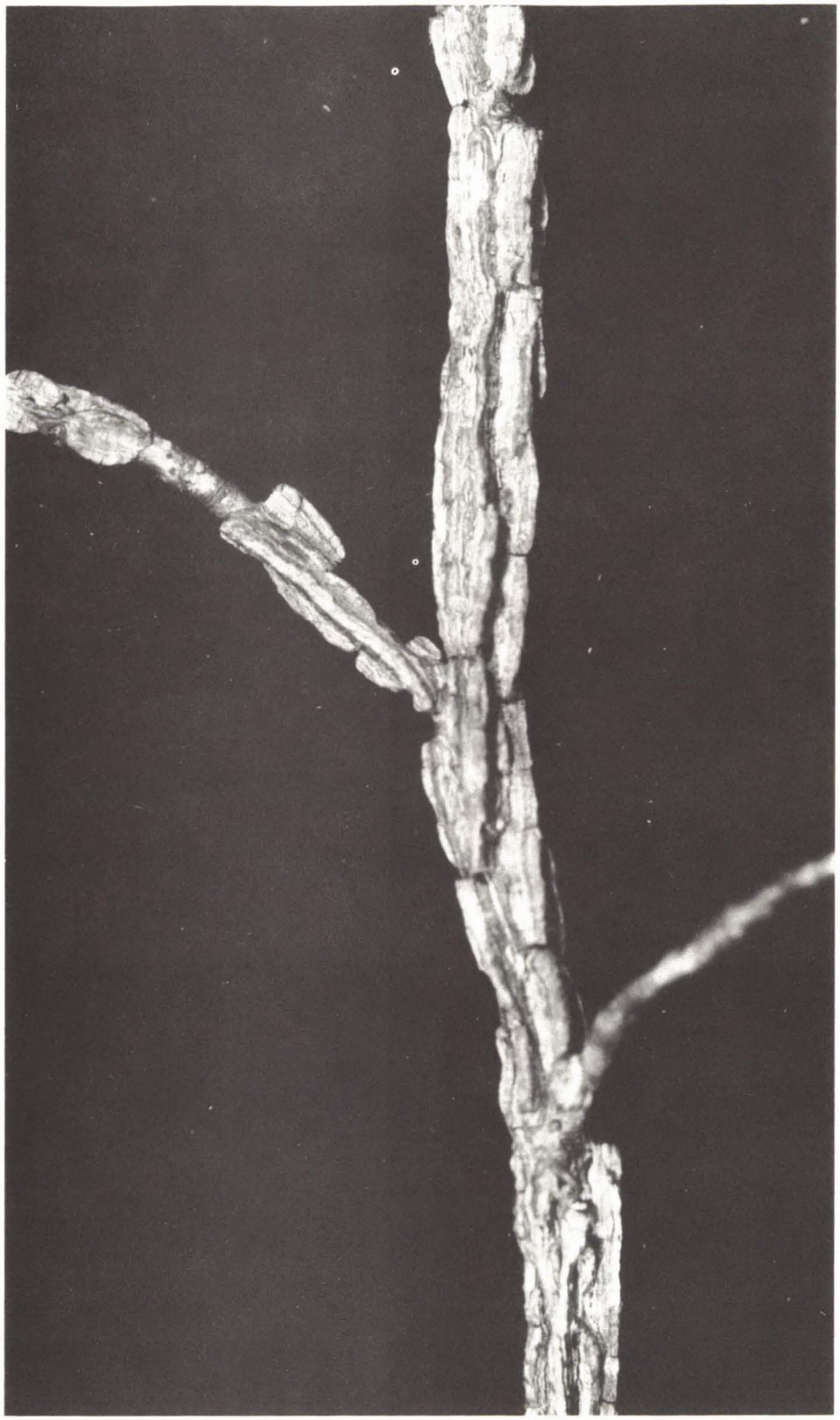

Figure 3—Sweetgum twig.

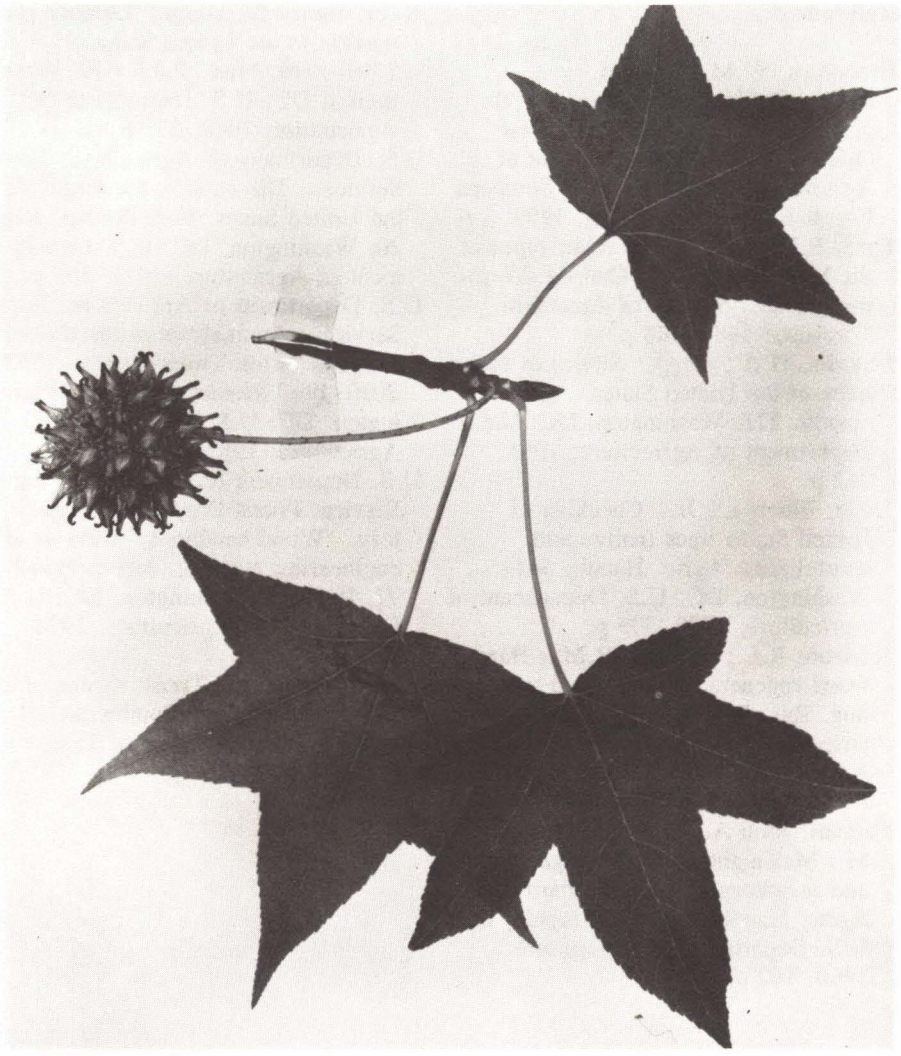

Figure 4—Sweetgum leaves and fruit.

Sweetgum is well distributed over all parts of the South and Southeast, sections of the country that historically have accounted for more than 90 percent of the total supply.

Production

Annual production of sweetgum lumber increased from 4 million board feet in 1869 to an average of about 400 million board feet between 1900 and 1905. During the next 17 years, production ranged between 500 and 800 million board feet. About 1 billion board feet were produced each year from 1923 through 1929. Production during the 1930's seldom exceeded 600 million board feet a year but increased to about 1 billion during the World War II era. Another decline occurred in the 1950's; production dropped to about 300 million board feet in 1960. By 1976, production had again risen to 1 billion board feet.

Total annual production from harvest of all merchantable sweetgum was at the average rate of 399 million cubic feet in 1970 and 302 million cubic feet in 1976.

Characteristics and Properties

The sapwood of sweetgum is white to pinkish; a faint to marked bluish tinge is the result of fungus infection. The heartwood varies through shades of red, reddish-brown, and brown and may include a very attractive grain figure sometimes called ''figured red gum.''

Annual rings are definite but inconspicuous. The wood is diffuse-porous, and the texture is uniform. Interlocked grain is common and contributes to both the difficulty in seasoning of the lumber and to a ribbon-stripe pattern.

The wood is moderately hard, stiff, and heavy—weighing about 36 pounds per cubic foot at 12 percent moisture content. The specific gravity, based on green volume and ovendry weight, is 0.46. A cubic foot of sweetgum sawdust weighs 17.9 pounds green and 8.8 pounds ovendry. Compared to other southern hardwoods, sweetgum is above average in turning, boring, and steam-bending properties, and intermediate for planing, shaping, bending, splitting, and nail- and screw-holding ability. It has very large shrinkage in drying and does not stay in place well during use. The heartwood requires special treatment before gluing can be done with best results. The heartwood has low to moderate decay resistance and does not weather well, having a tendency to cup and check.

Length of the wood fibers averages about 1.8 millimeters. It varies significantly according to geographic area, but even more among individual trees within a single forest. The wood is readily pulped by sulfate and semichemical processes, yielding fine paper, liner board, or rayon according to the process used. When used as fuel,

sweetgum is fairly difficult to split and produces only about three-fourths as much heat per cubic foot of wood as red oak having an equivalent moisture content.

If sweetgum is wounded by scraping the bark away, the new growth of wood secretes a clear, balsamic oleoresin that tastes like turpentine and is known as storax or styrax. Weathering turns the resin to a fragrant, chocolate-brown substance called "sweetgum," often chewed by children.

Principal Uses

Sweetgum is used principally for lumber, veneer, plywood, slack cooperage, railroad ties, fuel, and pulpwood. The lumber goes into boxes and crates, general usage, dimension stock, and is remanufactured into furniture parts and fixtures. Veneer usage follows the same pattern, except that a greater proportion goes into containers and prefabricated products. Plywood goes mostly into containers, although interior construction and furniture-making use large quantities. Sweetgum is also used for interior plies of sheathing plywood.

Storax is used in medicinal and pharmaceutical preparations, especially salves for skin and mucous membranes. It is also used for adhesives, incense, perfuming powders, and soaps; as a fixative in heavy perfumes; and to flavor tobacco. The commercial market for storax is normally supplied by the oriental species, *Liquidambar orientalis,* but if that supply is interrupted, gum from the American species is easily substituted.

The spiny-ball fruit is often painted silver or gold, adorned with sequins or glitter, and used for Christmas-tree decorations.

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